

WHAT IS CLAIMED IS:

1. A method for producing a mixture of a nucleic acids, said method comprising:
  - (a) providing an array of distinct single-stranded probe nucleic acids of  
5 differing sequence where each distinct probe present on said array comprises a constant domain and a complement variable domain;
  - (b) contacting said array of single-stranded probe nucleic acids with nucleic acids complementary to said constant domain under hybridization conditions, whereby a template array of overhang comprising duplex nucleic acids is produced,  
10 wherein each overhang comprising duplex nucleic acid of said array comprises a double-stranded constant region and a single-stranded variable region overhang; and
  - (c) subjecting said template array of overhang comprising duplex nucleic acids to primer extension reaction conditions under conditions sufficient to produce said mixture of nucleic acids;  
15 whereby said mixture of nucleic acids is produced.
2. The method according to Claim 1, wherein said mixture of nucleic acids is a mixture of deoxyribo-oligonucleotides.
- 20 3. The method according to Claim 1, wherein said constant domain comprises at least one domain selected from the group consisting of: a linker domain; a functional domain; and a recognition domain.
4. The method according to Claim 1, wherein said step (c) comprises a protocol  
25 selected from the group consisting of: linear PCR; strand displacement amplification; and *in vitro* transcription.
5. A method for producing a mixture of a plurality of distinct deoxyribo-oligonucleotides of differing sequence, wherein each distinct constituent  
30 oligonucleotide of said plurality comprises a different variable domain V, said method comprising:
  - (a) providing an array of a plurality of surface immobilized distinct single-stranded probes, wherein each distinct surface immobilized single-stranded probe present on said array is described by the formula:

surface-L-R-F-cV-5'

wherein:

L is an optional linking domain;

R is a recognition domain;

5 F is a functional domain; and

cV is a complement domain having a sequence that hybridizes under stringent conditions to a variable domain of one of said distinct oligonucleotides of said plurality;

(b) contacting said array of a plurality of surface immobilized distinct  
10 single-stranded probes under hybridization conditions with a population of nucleic acids of the formula:

5'-cR-cF-3'

wherein:

cR is the complement of R; and

15 cF is the complement of F;

whereby a template array of overhang comprising duplex nucleic acids is produced, wherein each overhang comprising duplex nucleic acid of said array is described by the formula:

surface-L-R-F-cV-5'

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5'-cR-cF-3'; and

(c) subjecting said template array of overhang comprising duplex nucleic acids to primer extension reaction conditions;

whereby said mixture of a plurality of distinct oligonucleotides of differing  
25 sequence, wherein each distinct constituent of said plurality comprises a different variable domain V, is produced.

6. The method according to Claim 5, wherein said linker domain ranges in length from about 0 to 10 bases.

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7. The method according to Claim 5, wherein said functional domain is an RNA polymerase promoter domain.

8. The method according to Claim 5, wherein said recognition domain is a recognized by a restriction endonuclease.
9. The method according to Claim 5, wherein said step (c) comprises a protocol  
5 selected from the group consisting of: linear PCR; strand displacement amplification; and in vitro transcription.
10. A method of making a population of target nucleic acids from an initial mRNA sample, said method comprising:
- 10 (a) generating a mixture of nucleic acids according to the method of Claim 1; and  
(b) employing said mixture of nucleic acids as primers in a target generation step in which target nucleic acids are produced from said mRNA sample;  
whereby said population of target nucleic acids is produced.
- 15 11. The method according to Claim 10, wherein said target generation step (b) comprises a template driven primer extension reaction.
12. The method according to Claim 10, wherein said target generation step (b) produces labeled target nucleic acids.
- 20 13. A hybridization assay comprising the steps of:
- (a) generating a set of target nucleic acids according to the method of Claim 10;
- (b) contacting said set of target nucleic acids with an array of probe nucleic  
25 acids under hybridization conditions; and
- (c) detecting the presence of target nucleic acids hybridized to probe nucleic acids of said array.
14. The assay according to Claim 1, wherein said target nucleic acids are labeled.
- 30 15. The assay according to Claim 1, wherein said assay further comprises washing unbound target away from the surface of said array.

16. An array comprising a plurality of distinct single-stranded probe nucleic acids immobilized on a surface of substrate, wherein each of said single-stranded probe nucleic acids is described by the formula:

surface-L-R-F-cV-5'

5            wherein:

L is an optional linking domain;

R is a recognition domain;

F is a functional domain; and

V is a variable domain;

10            wherein only said variable domain V is different for each distinct single-stranded probe nucleic acid of said array.

17. The method according to Claim 16, wherein said functional domain is an RNA polymerase promoter domain.

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18. The method according to Claim 16, wherein said recognition domain is recognized by a restriction endonuclease.

19. The method according to Claim 16, wherein L ranges in length from about 0 to  
20    10 bases.

20. A kit for use in the method of Claim 1, said kit comprising:

(a) universal primer; and

(b) an array of probe nucleic acids or a means for producing the same.

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